A FORMAL ANALYSIS OF LITHIC MATERIALS FROM DlPu7, TOP OF THE WORLD, BRITISH COLUMBIA

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ABSTRACT

A survey of Top of the World Provincial Park located a quarry site and numerous "workshop" areas. A formal analysis of surface-collected lithic materials from one site located is undertaken. Much of the surface scatter at this site (DlPu7) is the quarried material, but many lithic materials foreign to the quarry area are also present.

Artifacts are grouped on the basis of position and extent of retouch and type of raw material utilized. A large variation within artifact classes necessitates individual description in many cases. Functional inferences are avoided. Sample inadequacies limit the data obtained, but all cores and most bifacial edges are of the quarried material, while most unifacial edges are of the foreign lithic material.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

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INTRODUCTION

Top of the World is a glaciated, mountainous region east of the Kootenay River, lying between the Hughes and Van Nostrand Ranges, approximately twenty-five air miles north north east of Cranbrook, B.C. Historically, the area is the territory of the Upper Kutenai Indians. (Chamberlain 1892).

Access to the area is afforded by the Lussier River ("Sheep Creek") and Coyote Creek from the north, and the west fork of Galbraith Creek from the south. The maximum elevation is Mt. Morro (9,553'), although most of the area is between 7,000' and 8,500'. Vegetation is Alpine and sub-Alpine coniferous; soil is generally a thin brown alluvial-loessal silt overlying till, outwash or the limestone bedrock.

On July 28-29, 1973, five members of the Libby Reservoir Archaeology Project (field director Wayne Choquette, Bill Brown, Robin McCauley, Bob Powell and the author) undertook a partial site survey of Top of the World Provincial Park, entering by way of the west fork of Galbraith Creek. Sixteen sites were located and recorded (DkPu1, DlPu2-16), including a quarry site, a rockshelter and numerous "workshop" areas. Cultural materials collected on this survey, including those presented in this paper, are

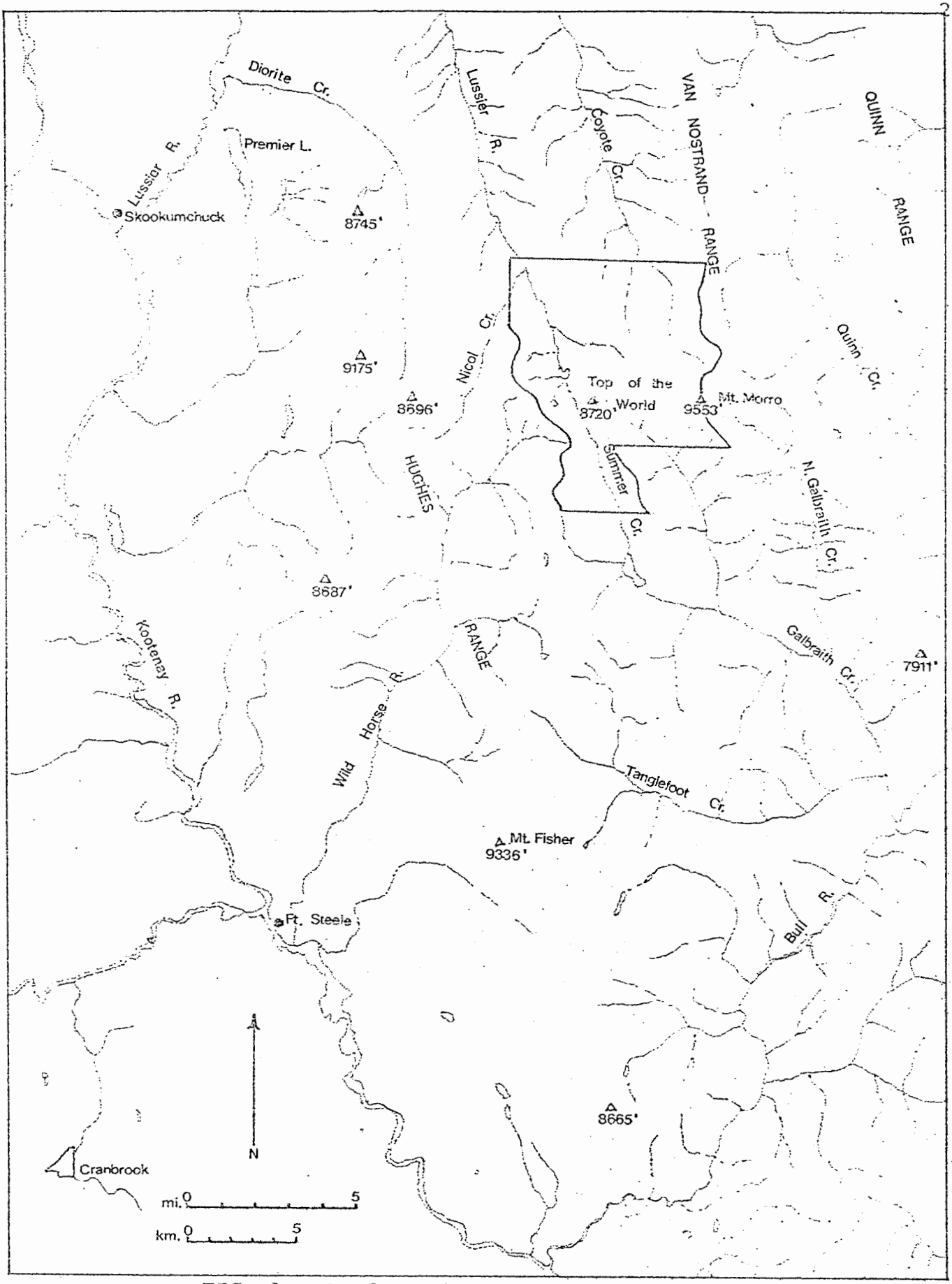

FIG. 1. Surface Features of Top of the World and Surrounding Area

presently held by the British Columbia Provincial Museum, Victoria, B.C.

Cultural material littered the entire area, consisting of chipping detritus and artifacts, almost exclusively made of a grey, translucent vitreous chert (TVC). The quarry site located proved to be at least one of the sources for this material. Only at three sites and the quarry, were any other types of lithic material observed, then only in very small quantities, vastly outnumbered in all cases by the amount of TVC present. All non-TVC lithic materials, because of their observed limited occurrence and small quantities, are termed "exotic" and considered foreign to the area.

The subject of this paper, DlPu7, is one of the sites where exotic materials were present in relatively large numbers. This is elaborated in the formal analysis.

DlPu7 Site Description

Much of the following information is from the site survey form written by Wayne Choquette (1973).

Lying above a large alpine meadow, DlPu7 is located at an elevation of 7800' on a glaciated step on the southern lip of a cirque basin and on the west side of a small, north-south draw, with a glaciated knoll forming the western bounds.

The cirque basin contains a remnant tarn, and a small meltwater stream flows down the north-south draw.

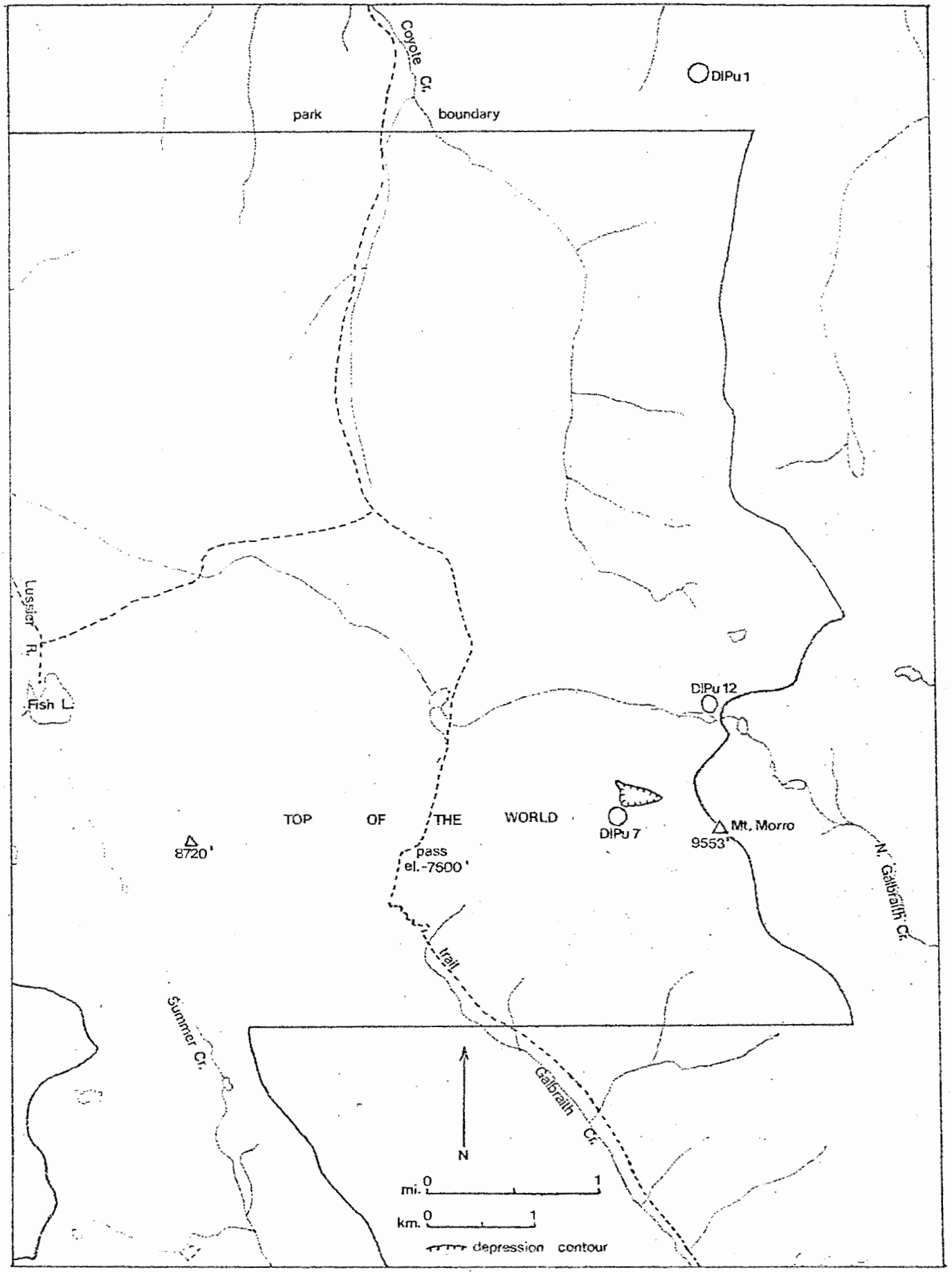

FIG. 2. Top of the World Region

Vegetation is a sparse Alpine growth with stunted sub-Alpine conifers occurring on the south perimeter. A light brown alluvial-loesall silt occurs with limestone till and bedrock. No estimate is available for the depth of the deposits, but the surface is cracked and appears eroded.

Large amounts of TVC chipping detritus as well as some exotic materials are present. Features are difficult to determine beyond the obvious concentrations of detritus. Fire broken rock would of necessity be limestone, it being the only naturally occurring rock (except chert) in the area. An identification of fire cracked or broken limestone as such, cannot be made with confidence. No charcoal or ash can be observed, and of the faunal material collected (2 bone fragments) only one is burnt.

Undoubtedly, the site is disturbed, mainly from the effects of weather, notably wind and water erosion. As cultural material in the site collection is entirely surface collected, there is no vertical dimension and of course, no direct archaeological associations can be made.

It is also possible that before our survey, the site has been collected from by relic collectors and other visitors. Some of the brighter coloured exotic materials would seem especially vulnerable in this regard. Previous to the survey, several people had mentioned to Wayne Choquette that they knew of "obsidian" deposits around Top of the World area (Keddie 1971). The fact that the park

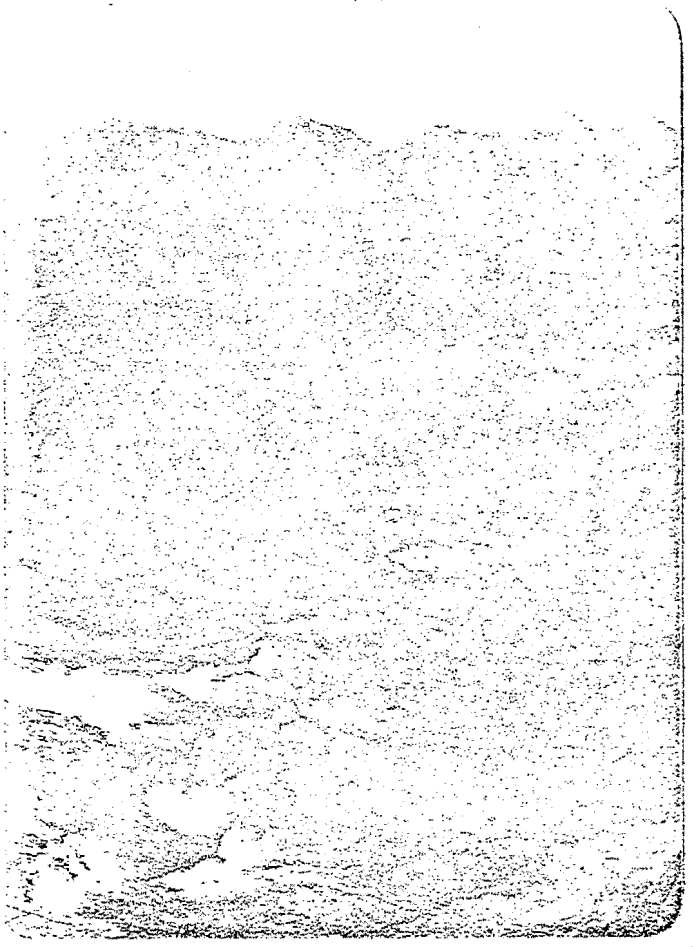

FIG. 3. Over-all view of DlPu7-

View is from above looking south west. DlPu7 is just below and slightly to the left of centre.

itself is virtually undeveloped wilderness, requiring travel by foot or horseback has probably served to minimize pot-hunting, although the possibility cannot be entirely discounted.

In addition to the above limitations are problems posed by the nature of the sample and method of collection. These are not in any way intended to excuse short-comings, but to aid in the evaluation of the presented material.

FIG. 4. D1Pu7 Surface Scatter Concentration of TVC Flakes. Scale is 15 cm.

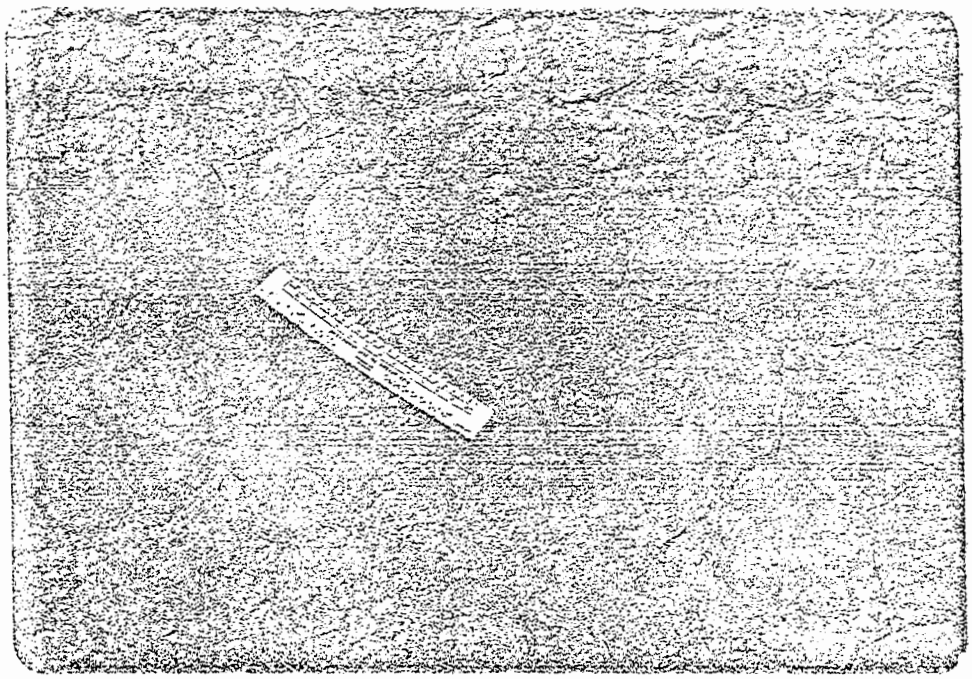

FIG. 5. D1Pu7 Exotic Materials "cache". Four Basalt artifacts are shown with some TVC detritus. Scale is 15 cm.

Although the collection contains a range of lithic material types, detritus, artifacts and unmodified blocks of raw material, 118 specimens is an admittedly small sample size. Surface collection was, strictly speaking, non random, and with the exception of one locality (a small cache of exotic material with TVC detritus), non systematic.

While there was no conscious favouring of artifacts over detritus, or of one particular artifact type, exotic lithic materials are probably over represented, resulting in a skewed sample.

Binford and Papworth make several observations about the nature of a quarry site (the Eastport Site, Antrim County, Michigan) which may be relevant to DlPu7; "Although no direct data is available to support the argument that occupations were seasonal, it seems reasonable that the gathering and processing of stone at the "quarry" would be a warm weather activity." and, "since the Eastport site has been tentatively identified as a functionally specific site where quarry activities were carried out it is certainly not representative of the entire range of the socio-cultural system represented." (1963: 119-21).

If indeed a similar situation exists at DlPu7, the sample is biased.

Classification

All artifacts in the DlPu7 site collection are included in the broad category "chipped stone" and have been classified according to the extent and position of flaking and retouching and secondly, raw material utilized. The attributes that define each class and sub-class are discussed in the formal analysis. Most of the terms used in the analysis are those defined by Anta M. White (1963), whose work has been relied upon for much of this paper. It is recognized that the classes are constructed and may not "accurately and reliably reflect the classes of the artifact makers." (Deetz 1971: 73)

Sackett notes that ". . . the attributes that make up the formal spectrum of an archeological assemblage rarely segregate with perfect consistency among artifacts, but instead almost always exhibit a degree of seemingly random combination. Consequently artifacts are never identical but only more or less similar. . ." (Sackett 1966: 357). Because of the small sample size, to avoid ". . .a situation wherein each individual constitutes a class by itself. . ." (Brew 1971: 83) classification tends to be somewhat inclusive with resultant variations within sub-classes. Bordes' concept of a "hierarchy of characteristics of classification" has been found useful in view of the above. (1961b:1).

In accordance with White, "Functional terms, such

as "scrapers" . . . are avoided in the formal classification, since little is known of the actual function of many artifacts. The necessity of using technological definitions instead of common terms has been previously discussed (Gardin 1958) and needs no repitition." (1963: 11).

Binford and Papworth (1963: 79) observe that ". . . the attributes which some archaeologists believe to be indicative of such techniques as pressure flaking are questioned by other archaeologists, but formal differences can not be argued about as such." Flaking and retouching are described in the analysis, but inferences as to the motor habits employed in the production of artifacts are avoided.

Work done by Semenov (1964) has provided the basis for observations of wear patterns on certain artifacts, although this has not been studied in depth in the following analysis and does not reflect the quality of Semenov's work.

All artifacts bear the site code (DlPu7) and a catalogue number, but are referred to only by the catalogue number to simplify presentation of this report. (After Mitchell, 1971).

Measuring Technique

Measuring technique is consistent with that outlined by White (1963: 10). Briefly, length is defined as the maximum distance from the striking platform, where determinable, even if the artifact is wider than it is long.

Bifacial artifacts are measured along the longitudinal axis. In the case of a relatively amorphous artifact, the principle of the smallest containing rectangle is followed, length being the maximum dimension. Width is measured normal to the longitudinal axis at the broadest point. In order to avoid an inflated thickness dimension, this measurement is taken immediately after the bulb of pressure or percussion, where present. Thickness is the maximum dimension between dorsal and ventral surfaces.

All measurements are expressed in centimeters, to the nearest millimeter, in a standard order, length, width and thickness. Parenthetic measurements denote a fragmented artifact. Weight is expressed in grams, where given.

FORMAL ANALYSIS

Raw Materials

A. TVC

Lithic materials identified as translucent vitreous chert exhibit a considerable range in colour, translucence and overall quality, although there are basic similarities which justify this identification. All varieties of TVC are assumed to be indigenous to the area (i.e. from local quarry sources). The importance of this material warrants a fairly detailed discussion.

As previously noted, the most abundant material in the area and the site collection is TVC. At the headwaters of north Galbraith Creek, at the 7,500' level, one of the sources for this material was located, a quarry site designated DlPul2. There, outcrops of grey, grey white and black TVC occur in alternating layers with the limestone matrix. A previously recorded outcrop near the headwaters of Coyote Creek, DlPul, is described as a "glassy basalt or possibly obsidian" (Keddie 1971). Although DlPul was reported by a local guide and prospector, and not visited by Keddie or the 1973 survey, it seems likely that this material is at least similar to TVC.

As DlPul2 alone cannot account for all the observed varieties of TVC, there are probably other quarry sites in

the area. Chamberlain notes that "The stone arrow head. . . was of flint. . . obtained. . . by the Upper Kootenays of the region about Fort Steele from the vicinity of Sheep Creek." (1892: 564). (The Lussier River is known locally as "Sheep Creek").

As represented in the ClPu7 collection, the colour of TVC ranges from grey-white and grey to grey-black and may be solid, banded or occasionally mottled. Generally the lighter shades pass most light, darker specimens being translucent only on thin edges, but this is not invariable. Vitreosity also varies, at least one artifact (No. 11), has a granular area grading into a vitreous area. In pieces of poor quality, impurities, fissures and small cracks are often present. Orthogonal fracture, splitting along cleavage planes and a tendency to step flake are common. Cortical surfaces show traces of the limestone matrix, usually remaining as a thin, tan or grey "rind" although it is sometimes present as a relatively thick (.2-.4 cm) layer.

B. Exotic Materials

Many types of exotic materials are present at the site, but an exact identification as to lithic type is sometimes difficult. Sixteen selected specimens were identified by an experienced rockhound and also a geologist, with differences of opinion in certain areas, but this would seem to be mainly a problem in terminology. Indeed, as Crabtree writes, "My analysis of lithic materials. . . may

differ from the mineralogist's definition because our purpose is not the same." (Crabtree 1967:8)

Basically, Crabtree considers jasper and agate to be variations of chalcedony, ". . . the primary material in the formation of all cryptocrystalline quartz family rocks" (1967: 12). In view of the above, all "jasper" and "agate" in the collection are referred to as "chalcedony".

Besides the range of chalcedony noted are varieties of basalt, chert and other materials sometimes represented by only one or two specimens (e.g. felsite, silstone), including those which can only be identified in a descriptive sense (e.g. "silicified sedimentary"). These materials are more fully described in the individual artifact description.

Artifacts manufactured of material exotic to the site are ". . . taken as evidence of their having been manufactured elsewhere and introduced into the site as finished artifacts." (Binford and Papworth 1963: 106).

At present, only one exotic lithic material is identifiable as to source, Avon chert, a creamy white chert quarried near Avon, Montana. (Wayne Choquette pers. com.)

Detritus

A total of twelve flakes and unmodified blocks of raw materials are classified as detritus. The flakes are all of a small size.

Two specimens of a grey to dark grey TVC are fragments, quadrilateral in cross section with flat, parallel dorsal and ventral surfaces. The larger specimen is perhaps worthy of note in anticipation of similar "tabular flakes" (White 1963: 13) which are partially bifacially chipped in the "Cores and byproducts" class. It is (7.7) X (4.6) X 1.6 cm. and weighs 62.8 g.

TABLE I

Detritus Distribution by Material Type

Material Type	Number
TVC	8
chalcedony	2
basalt	1
indeterminate	1
Total	12

Utilized Flakes

The attributes which distinguish "use" retouch from intentional retouch are adopted from Bordes (1961b) and White (1963). Both authors observe that "utilized" flakes can be due to human use or natural causes (pseudo artifacts) but Bordes notes that they merit consideration.

Basically, use retouch is characterized by small irregular, discontinuous flake scars on acute, steeply bevelled or broken flake edges, often having a serrated or crushed appearance. In some cases, it is difficult to

determine if retouch is intentional or a result of wear pressure. This is later dealt with in the discussion of marginal retouch.

Utilized flakes form a large part (over 47%) of the artifact total but are here only briefly considered as no recurrent pattern is evident.

TVC utilized flakes show a wide range in colour and overall quality as noted in the discussion of raw materials, and are generally irregular in shape and rather thick. When collected, most of the TVC flakes were thought to be simply detritus, but a closer examination showed the characteristics of utilization. Some appear to be fragments of larger flakes.

Utilized flakes of exotic materials are generally thinner than the TVC flakes and appear more regular in shape. At least three distinct types of chert can be distinguished, five flakes of a light tan chert, one of a sandy tan chert and four of a cream white to orange brown chert (although possibly all four are distinct types in themselves). Chalcedonies range from a pink white through yellow orange to a deep red brown and probably represent at least three distinct types.

Three utilized flakes of exotic materials warrant specific mention.

No. 34: 2.4 X 1.6 X 0.5 cm. This chalcedony flake has an overall "wedge" shape (no inference as to function)

with large, thick, irregular scars suggesting a rather heavy handed usage.

No. 40: 4.8 X 4.7 X 0.7 cm. A flake of a basalt showing many small gas bubbles is remarkable both because of its size and regularity, presenting an almost perfect diamond shape. One edge has a crushed broken appearance.

No. 73: (2.3) X (2.7) X 0.3 cm. A brown siltstone fragment has a utilized "beak" or projection although the material does not appear to be especially hard or tough.

TABLE II

Utilized Flake Distribution by Material Type

Material Type	Number
TVC	31
chert	10
chalcedony	7
basalt	1
siltstone	1
Total	50

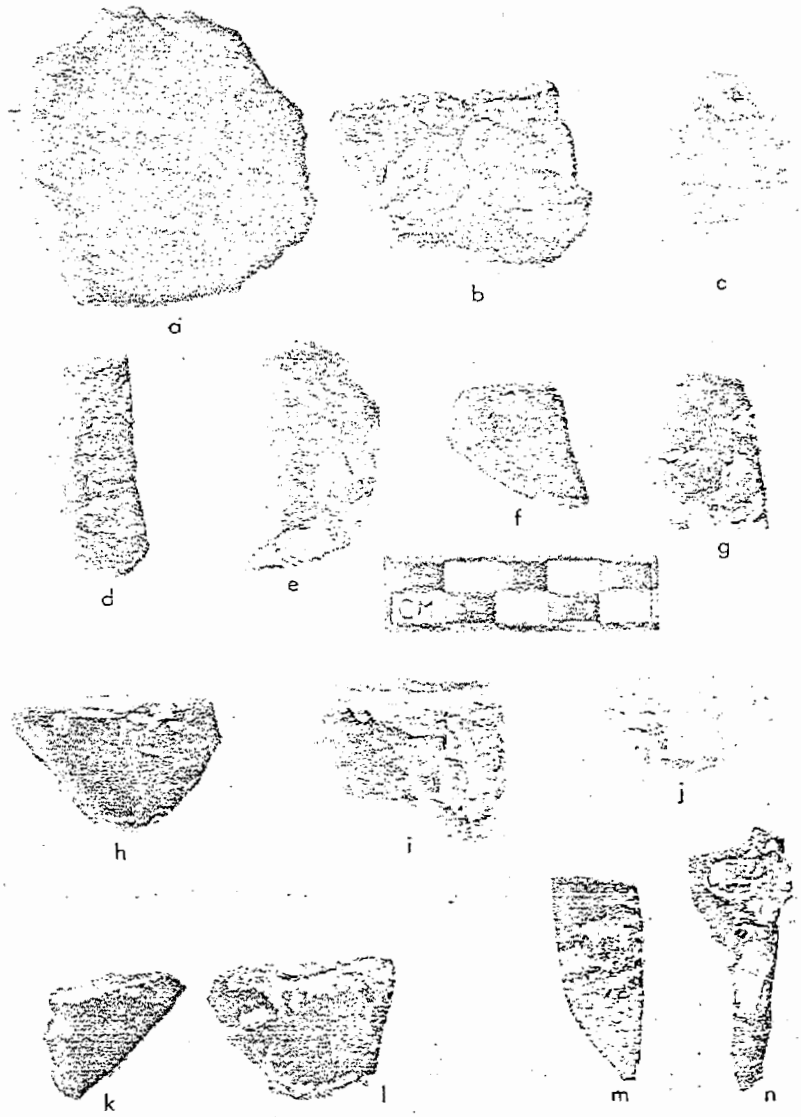

FIG. 6. Cores and Byproducts

a, block core; b-g, tabular chipping byproducts; h-j, pyramidal cores; k, l, prepared core fragments; m, n, indeterminate core byproducts.

CORES AND BYPRODUCTS

"The term 'core' refers to a block or nodule from which flakes are detached." (White 1963: 6).

The twelve artifacts in this category are divided into three classes: "Unprepared cores", "Prepared cores" and "Indeterminate core byproducts". All artifacts in these classes and their sub-classes are of TVC.

I. Unprepared cores

"Unprepared core is the term used when primary flaking is restricted to the preparation of a striking platform. Flakes are struck by more or less flat flaking." (White 1963: 6).

(a) Block cores

"The block core is characterized by a relatively flat straight face from which flakes were removed." (Binford and Papworth 1963: 83). One artifact may be classed as a block core.

No. 56: (Fig. 6a), 6.8 X 5.9 X 4.5 cm, 168.1 g. Striking platforms have been prepared over most of the edge of the core by battering. Adjacent to the flaked surface is a plane fracture at right angles to the banding of the material. The outer surface is tan in colour with parallel striations resulting

from the erosion of softer bands in the material.

(b) Tabular chipping nuclei and byproducts

"Tabular flakes have a quadrilateral cross-section; both inner and outer surfaces are flat and parallel. . ." (White 1963: 13). Flakes with flat dorsal surfaces are characteristic byproducts.

The six artifacts in this subclass all have remnants of flat surfaces on one face (dorsal), similar to those on an unmodified block of TVC described under "Detritus".

One specimen, No. 68, has been only slightly retouched, but a natural acute edge shows utilization on both sides. A cortical surface has served as a striking platform.

Four specimens, No.'s 65, 3, 35, 63, are partially bifically flaked. No. 35 shows a large negative bulbar scar on the ventral surface and remains of cortex on both ends.

Two artifacts, No.'s 30, 63, have similarly unifacially retouched edges along a steep broken edge which is concave in cross section. No. 63 shows utilization both on the unifacial edge and the remaining part of the bifacial edge. Both have cortex remaining on one end and are of a high quality TVC.

TABLE III

Tabular Chipping Byproducts

Artifact No.	Dimensions	Weight	Notes
68	3.8 X 4.9 X 1.3 cm.	29.7 g	(Fig. 6b)
65	3.8 X (3.3) X 0.8 cm.	13.5 g	(Fig. 6c)
3	4.6 X (2.2) X 1.1 cm.	13.3 g	(Fig. 6d)
35	4.9 X (2.4) X 1.1 cm.	22.9 g	(Fig. 6e)
63	(2.7) X (2.7) X 0.8 cm.	6.9 g	(Fig. 6f)
30	(3.3) X (2.6) X 0.9 cm.	8.1 g	(Fig. 6g)

II. Prepared cores

Prepared cores are distinguished by the "presence of a systematic lateral preparation." (White 1963: 6).

Three artifacts in this subclass are termed "pyramidal cores". Flake scars run from the striking platform to the apex of the core, but lack the regularity and parallel sides associated with blade cores. These may have served as lamallar (blade-like) cores although no TVC lamallar flakes are present in the site collection. One of these cores, No. 31, is made of a high quality TVC and shows very carefull platform preparation. A similar specimen, No. 32, has an unmodified cortical surface as the striking platform and is made of an inferior grade of TVC with impurities throughout. No. 75 is similar, but fragmented.

Two specimens of dark grey-black TVC are core remnants or fragments which exhibit some lateral

preparation, but it is difficult to determine if they represent a single platform type. Both have cortical surfaces which have served as striking platforms. One of these, No. 60, has cortex on both ends and may be a double platform core. No. 74 is similar but is fragmented.

TABLE IV

Prepared Cores

Artifact No.	Dimensions	Weight	Notes
31	2.9 X 4.3 X 2.0 cm.	28.9 g	(Fig.6h)
32	3.4 X 3.9 X 1.8 cm.	25.3 g	(Fig.6i)
75	(1.9) X (3.6) X (1.2) cm.	12.2 g	(Fig.6j)
74	(2.4) X (3.1) X (1.7) cm.	10.3 g	(Fig.6k)
60	2.6 X 3.7 X 1.3 cm.	14.0 g	(Fig.6l)

III. Indeterminate core byproducts

Two artifacts are associated with cores, but cannot be placed in either of the preceding classes.

No. 67: (Fig. 6m), 4.0 X 1.7 X 2.1 cm., is a blocky flake quarter round in cross section. One side bears platform preparation on a cortical surface. No bulbar scar is present, the flake appears to be the result of an accidental fracture rather than an intentionally created form.

No. 103: (Fig. 6n), 5.3 X 1.4 X 1.8 cm., is a long

narrow splinter-like flake, roughly triangular in cross-section. It presents several long edges and a narrow, steeply ended tip, all of which show utilization.

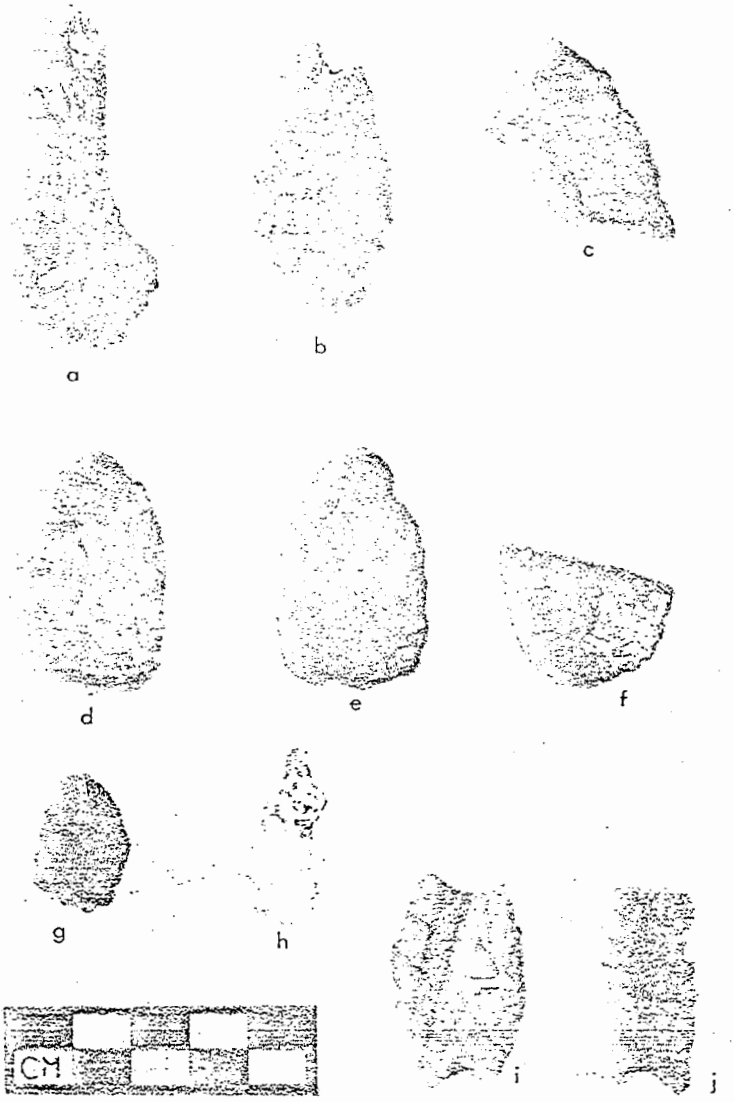

FIG. 7. Bifaces

a-g, TVC bifaces; h, chert biface fragment; i, j, TVC bifaces with basal indentation.

BIFACES

Bifacial artifacts show flaking over all or most of both dorsal and ventral surfaces and are characteristically bi-convex in cross section. A subclass considers those bifaces which exhibit secondary modifications, specifically basal indentations or "notching".

I. Bifaces

(a) TVC

The longest biface, No. 59, shows a remnant of a tabular surface, but is otherwise completely bifacially flaked. A longitudinal break may have served as a "back" for this object, the opposite distal edge shows some utilization.

A biface, No. 69, is missing parts of both distal and proximal ends. The flaking suggests skilled craftsmanship, considering the very poor quality of TVC.

The distal portion of a large biface, No. 13, has broken on a flaw in the material. The tip is marginally retouched, but the edges show no attempt at regularization.

Two complete specimens, No. 61 and No. 15, are similarly ovate and almost the same size. Both are relatively thick and bear large flake scars over

both surfaces. No. 61 shows numerous step flakes and appears less well formed than No. 15 which is of a better quality TVC. Some marginal retouch is present on both artifacts.

A basal fragment, No. 14, shows signs of utilization on the steep broken edge. The biface is relatively thin and shows well controlled flaking. The TVC is black, almost resembling obsidian.

A small biface, No. 93, is somewhat of an anomaly. It is completely bificially flaked, but is asymetrically bi-convex in cross-section and asymetrical in outline.

TABLE V

TVC Bifaces

Artifact No.	Dimensions	Notes
59	6.5 X (2.8) X 0.9 cm.	(Fig. 7a)
69	(5.2) X 2.7 X 1.1 cm.	(Fig. 7b)
13	(4.0) X (2.9) X 1.1 cm.	(Fig. 7c)
61	4.5 X 2.8 X 1.0 cm.	(Fig. 7d)
15	4.3 X 2.6 X 0.9 cm.	(Fig. 7e)
14	(2.6) X (3.1) X 0.7 cm.	(Fig. 7f)
93	2.5 X 1.8 X 0.8 cm.	(Fig. 7g)

(b) Exotic material

No. 54: (Fig. 7h), (3.2) X 1.4 X 0.7 cm., is a thick, narrow biface fragment made of an opaque creamy beige chert. The proximal section has a waxy lustre, but the fragmented distal section appears discoloured and has a dull, flat finish. The broken area has two large flake scars which have a rough granular appearance. This is possibly the result of thermal action. Two very slight lateral indentations are present near the base, but they may be fortuitous. It is difficult to determine the artifacts original length or form

II. Bifaces with basal indentation

Two TVC bifacial artifacts are well formed, symmetrical and exhibit a single basal indentation, probably to facilitate hafting.

No. 12: (Fig. 7i), (3.8) X 2.4 X 0.8 cm., is almost complete, lacking part of the tip. The original length can be reasonably estimated at 4.4 cm. From a basal width of 1.0 cm., the sides curve outward to the maximum width of the biface and continue to arc towards the tip. The basal indentation is 0.25 cm. deep and 0.80 cm. wide.

No. 11: (Fig. 7j), (3.7) X 1.8 X 0.6 cm. An incomplete specimen is lenticular in cross-section and has

essentially straight, parallel sides (lanceolate). At the fragmented distal end, the sides appear to begin to converge, but no accurate estimate of original length can be made. The basal indentation is 0.35 cm. deep and 0.85 cm. wide.

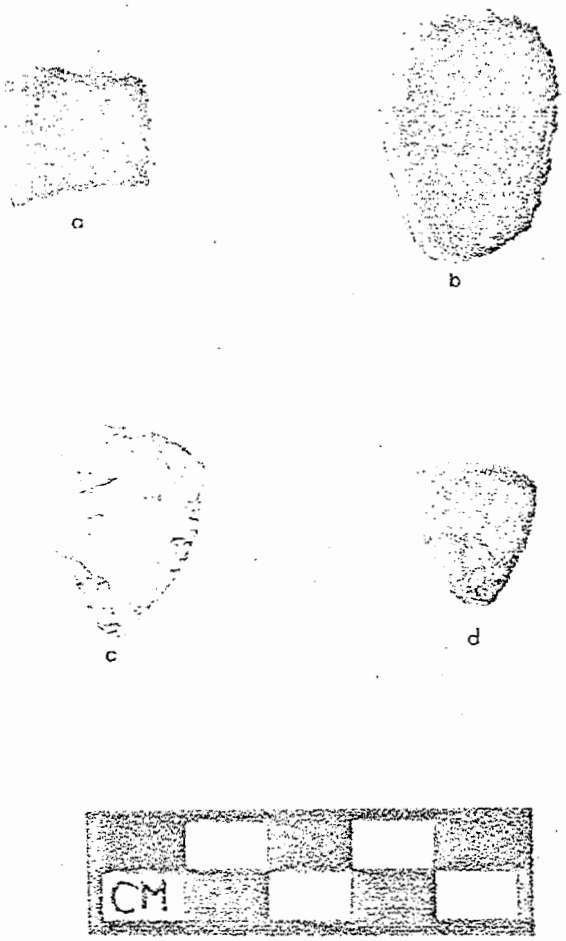

FIG. 8. Formed Unifaces

a, distal fragment; b, c, d, complete artifacts.

FORMED UNIFACES

This group of artifacts have well defined outlines and are unifacially flaked over all or most of the dorsal surface. All have a steeply retouched unifacial transverse working edge and are manufactured on flakes with concave ventral surfaces (longitudinal section). All are of exotic materials.

No. 22: This specimen is a distal fragment. It is parallel sided, with the main working edge slightly oblique to the sides. This edge exhibits extensive crushing on the dorsal surface. The lateral edges show some utilization on dorsal and ventral edge margins. The material is a red-brown chalcedony.

No. 1: Made of a fine grained basalt, the distal end and lateral edges show similar utilization along the dorsal edge margin. There is limited flat ventral retouching concentrated on the bulbar area. "This mode of retouching has been called "composite" to distinguish it from bifacial retouch." (White 1963: 43). The lateral edges converge slightly to the proximal end. The main working edge (distal end) is slightly convex in outline.

Two specimens are similar in outline, lateral edges converge rapidly to the proximal end. The main working edge

is the convex distal end, although the sides show slight utilization.

No. 57: This uniface is made of creamy white chert and has a single deep flake scar on the ventral surface of the distal end.

No. 23: A small specimen, made of chalcedony, shows composite retouch.

TABLE VI

Formed Unifaces

Artifact No.	Dimensions	Notes
22	(1.8) X 1.9 X 0.8 cm.	(Fig. 8a)
1	3.2 X 2.2 X 0.5 cm.	(Fig. 8b) also (Fig. 5)
57	2.6 X 2.1 X 0.6 cm.	(Fig. 8c)
23	1.8 X 1.5 X 0.4 cm.	(Fig. 8d)

FIG. 9. Marginally Retouched Artifacts

a-h, TVC; i-m, basalt; n-q gold chalcedony; r, chert; s, red-orange chalcedony; t, red-brown chalcedony; u, "silicified sedimentary"; v, silstone.

MARGINAL RETOUCH

Marginal retouch is confined to the marginal edges of the form. "Retouching is often confined to one surface and one edge, but may be present on all edges and both surfaces and may be localized or continuous. This results in a variety of combinations. . . of the same form." (Reeves 1970). Because of a large variation and small sample size, artifacts in this class are grouped solely as to raw material type in the interests of doing the least violence to the data.

Marginal retouch is distinguished from utilization by the former's continuity and regularity, but in some cases this is difficult to determine. Certain of these artifacts are classed as retouch on the basis of similarities with readily classifiable artifacts; i.e. edge shape, raw material, general form and extent of retouch.

Almost all artifacts in this class exhibit unifacial retouch, usually on the dorsal surface of an edge. Unless otherwise noted, "retouch" here means "unifacial retouch on the dorsal surface."

I. TVC

All artifacts in this sub class are steeply unifacially retouched. In all cases the retouch is confined to a small area with little or no forming of

other edges. Some are probably fragments of larger tools, or may simply have been produced on broken flakes with desirable edge forms.

Two artifacts warrant individual description.

No. 79 is formed on a blocky flake with some cortex attached. The dorsal working edge and slightly concave ventral surface bear utilization scars.

No. 7 is unusually retouched; the flake scars run almost parallel to the working edges, formed on a tabular surface.

TABLE VII

Marginal Retouch, TVC

Artifact No.	Dimensions	Notes
79	(2.5) X 3.0 X 1.1 cm.	(Fig. 9a)
7	(3.1) X (2.1) X 0.7 cm.	(Fig. 9b)
92	(2.2) X (2.5) X 0.6 cm.	(Fig. 9c)
66	(2.9) X (2.7) X 0.5 cm.	(Fig. 9d)
89	(2.9) X (1.1) X (0.9) cm.	(Fig. 9e)
80	(2.5) X (1.6) X (0.7) cm.	(Fig. 9f)
84	1.7 X 1.7 X 0.3 cm.	(Fig. 9g)
90	(1.4) X (1.3) X 0.5 cm.	(Fig. 9h)

II. Exotic materials

(a) Basalt

No. 37: A large primary decortication flake is bilaterally unifacially retouched. Both retouched edges are terminated by a transverse break. A straight, steeply retouched edge shows minute utilization scars, while the less steep convex edge bears several large utilization scars on the ventral surface and a light polish on parts of the dorsal edge.

The following four artifacts are all of a similar basalt and were found together with a basalt formed uniface (Fig. 5).

No. 6: Shows extensive composite retouch, with relatively flat flaking shaping the distal lateral edge. The opposite lateral edge is steeply "backed" and bears cortex.

No. 2: Shows complete, flat, ventral retouch. A single broad flake, almost the full length of the lateral edge has thinned the dorsal surface, while the corresponding ventral edge shows secondary marginal retouch and utilization. The opposite lateral edge is "backed" with cortex.

No. 4: Based on a flake with a concave ventral surface. A naturally steep distal end shows some retouch and extensive utilization. A lateral edge

also shows utilization but no attempt at regularization.

No. 5: The proximal portion of a lateral edge is steeply retouched, forming a long, straight edge.

TABLE VIII

Marginal Retouch, Basalt

Artifact No.	Dimensions	Notes
37	(7.6) X (7.1) X 1.5 cm.	(Fig. 9i)
6	4.5 X 2.4 X 0.7 cm.	(Fig. 9j) also (Fig. 5)
2	(3.8) X 2.5 X 0.8 cm.	(Fig. 9k) also (Fig. 5)
4	4.3 X 2.5 X 1.0 cm.	(Fig. 9l)
5	4.5 X 2.9 X 0.9 cm.	(Fig. 9m) also (Fig. 5)

(b) Gold chalcedony

No. 24: A flake fragment shows portions of two unifacially retouched edges.

No. 20: One surface of this flake fragment shows a convex edge with continuous unifacial marginal retouch. The same edge on the other surface is discontinuously retouched, forming various unifacial and bifacial areas, all of which show minute step flaking (utilization).

No. 25: A parallel sided blade-like flake is bilaterally unifacially retouched.

No. 21: A bilaterally, alternately (unifacially) retouched flake. The straight edges converge to the fragmented distal end. The original length can reasonably be estimated at 3.2 cm.

TABLE IX

Marginal Retouch, Gold Chalcedony

Artifact No.	Dimensions	Notes
24	(1.9) X (1.6) X 0.3 cm.	(Fig. 9n)
20	(2.2) X (1.4) X 0.3 cm.	(Fig. 9o)
25	(3.0) X 1.6 X 0.3 cm.	(Fig. 9p)
21	(2.7) X 2.1 X 0.3 cm.	(Fig. 9q)

(c) Creamy white chert

No. 48: (Fig. 9r) (2.3) X (1.4) X 0.4 cm. This specimen is symmetrical in outline and appears to be the tip of a larger tool, fragmented by a steep oblique break. The edges are well formed by steep, continuous unifacial retouch on the ventral edge margins. A small portion of the short edge shows some (bifacial) retouch on the dorsal surface below the tip, extending to the break. The longer side is unretouched on the dorsal surface and has similar wear patterns to other unifacial edge artifacts.

(d) Red-orange chalcedony

No. 33: (Fig. 9s) 2.0 X 1.8 X 0.4 cm. An amor-

phous flake bears extensive composite (ventral) retouch extending over most of the surface. Continuous unifacial retouch on the dorsal surface has produced a variety of bifacial and unifacial edges, all showing utilization of various kinds.

(e) Red-brown chalcedony

No. 16: (Fig. 9t) (2.1) X (2.8) X (0.8 cm). The dorsal surface of this fragment shows cortex remaining on one edge. The other edge is abruptly retouched with large, broad scars, and curves to the cortical edge forming a "beak" at the juncture. The ventral surface is completely retouched by essentially flat flaking. A large "pot-lid" fracture has removed most of the dorsal surface with cortex. Both the cortical edge and the "beak" clearly show utilization.

(f) "Silicified sedimentary"

No. 41: (Fig. 9u) (4.4) X (3.6) X 0.8 cm. This artifact has flat, parallel dorsal and ventral surfaces and is quadrilateral is cross-section. The material shows several plate-like fractures. A small (1.2 cm) portion of one edge is abruptly unifacially retouched forming an edge which is convex in outline. This edge is terminated by a sharp transverse break which may however be the "original" edge since the edges break naturally at

right angles to the surface. The retouching is well executed.

(g) Siltstone

No. 72: (Fig. 9v) (3.8) X (3.8) X 0.5 cm. A large flake has several fragmented edges. Very slight, continuous (unifacial?) retouch is present on the whole parts of the distal and lateral edges. The material is very light for its size. Both surfaces have a polish which has almost obliterated all traces of retouch.

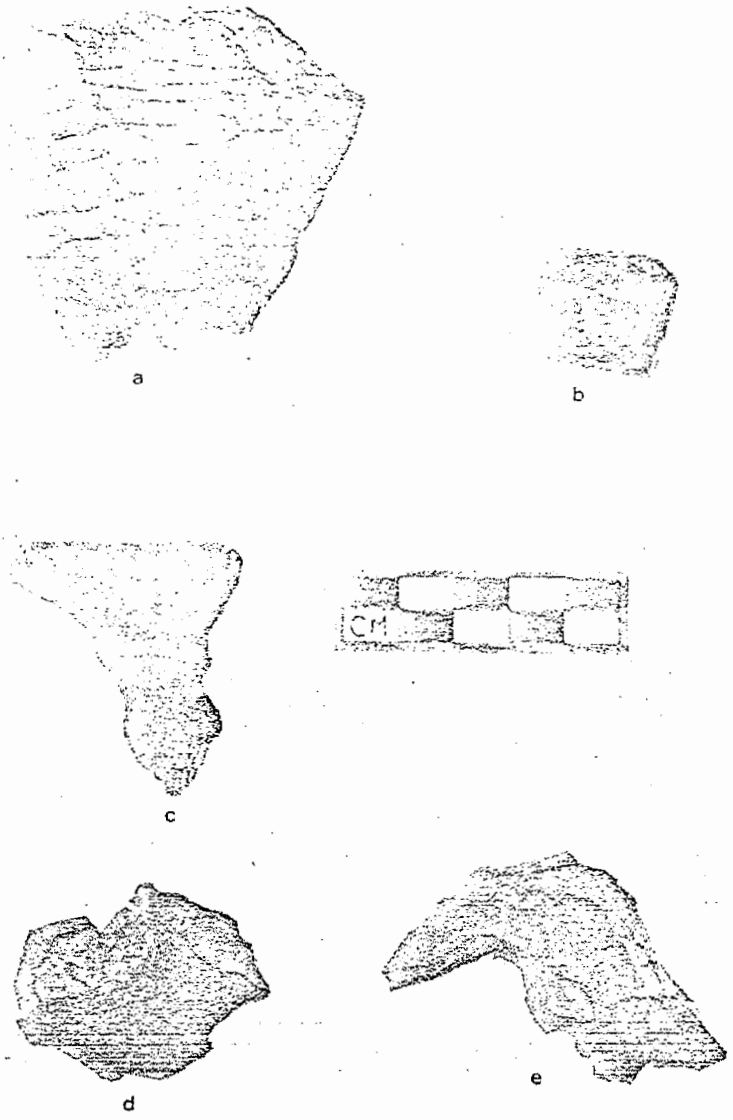

FIG. 10. Miscellaneous Artifacts

a, large felsite flake; b, crushed and battered TVC artifact; c, retouched, irregular, blocky flake, red-brown chert; d, e, irregular flakes, brown siltstone. A tan chert blade, No. 10, is not illustrated.

MISCELLANEOUS ARTIFACTS

All artifacts in this category are somewhat anomalous and warrant special mention.

(a) Felsite

No. 38: (Fig. 10a) 6.3 X 6.8 X 2.4 cm. A large, thick flake with some cortex remaining on the distal end. The dorsal surface is covered with large flake scars, the ventral surface is unmodified. Both lateral edges show utilization.

(b) TVC

No. 29: (Fig. 10b) 2.3 X (2.7) X 0.7 cm. This roughly square speciment is almost completely flaked and shows extensive crushing on two "wedge" shaped edges. One opposing edge is a transverse break, the other bears cortical surface and presents a battered appearance.

(c) Red brown chert

No. 39: (Fig. 10c) 4.8 X 4.7 X 1.6 cm. A large, irregular blocky specimen which does not appear to be entirely the result of intentional chipping. Rough and smooth surfaces are the same red-brown colour. A convex end and a slightly convex edge bear limited abrupt unifacial retouch and are dark grey-red in

colour, contrasting with the unretouched surfaces.

(d) Brown siltstone

No. 43: (Fig. 10d) 4.6 X 3.7 X 0.7 cm.

No. 42: (Fig. 10e) 5.2 X 4.7 X 1.0 cm. Two large irregularly shaped "flakes" are similar, lacking striking platforms or conchoidal ripple marks on the ventral surfaces. Both have pock marked dorsal surfaces and are possibly thermal spalls. Several acute and steep edges are present and show utilization to varying degrees, and possibly retouch on No. 42.

(e) Tan chert

No. 10: (not illustrated) 2.9 X 1.3 X 0.3 cm. This complete specimen is a blade, having a width to length ratio of .23 (White 1963: 8). The lateral edges are slightly expanding and a single straight arris is present on the (dorsal) surface. Both blade edges are utilized.

SUMMARY

TABLE X

Distribution of Artifacts by Material Type

Artifact Class	TVC	Exotic Material	Total
Utilized flakes	31	19	50
Cores and byproducts	14	0	14
Bifaces	9	1	10
Formed unifaces	0	4	4
Marginal retouch	8	14	22
Miscellaneous	1	5	6
Total	63	43	106

CONCLUSIONS

Because of the sample limitations, no firm conclusions are drawn from the data, however several hypotheses are here advanced.

The site, because of its location, would seem to have been occupied in the warmer months of the year, primarily for the purpose of exploiting the quarry sites. The presence of tools made of exotic lithic materials and ready supply of water suggest that DlPu7 represents more than a workshop, possibly a campsite.

It is recommended that Top of the World Provincial Park be fully surveyed and that the sites be mapped and systematically collected before park use causes destruction.

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PITHOUSE RECONSTRUCTION PROJECT OUTLINE

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PREFACE

This project was conceived out of problems occasioned during excavation of a prehistoric pithouse village site. Therefore its' prime aim will be solution of these problems and the main accents of testing will lie in areas directly associated with the sources of, or beleived sources of, these problems. Along with the test situations created to solve these problems will occur many opportunities for co-related studies in sociology, anthropology, psychology, etc. As many co-related studies will be carried on as appear feasable, but, they will be secondary to the archaeologic tests for which the project is being designed.

PROBLEMS

The basic problems which occasioned this study are as follows:

1. How is a pithouse constructed, how long does it take to build a pithouse, how much labour does building require, how durable is the structure, how often are repairs needed, and perhaps, what is the most efficient structural formula?

2. What are the living conditions imposed by a pithouse, how efficient is heating, how often is cleaning necessary, how does activity in the pithouse relate to shifting of earth-deterioration of pithouse, what changes in 'normal' human activity are necessitated by the pithouse environment, and why would a pithouse be a preferable type of structure in the interior of B.C.?

3. How does a pithouse detericrate, how does activity affect the consolidation of the surrounding soil, where is soil likely to be built up or taken away, how does a pithouse structure collapse and relation to original structural make-up?

4. How efficient are present day excavation techniques, how does the collapsed pithouse settle, how do positions of objects relate both before and after collapse?

SCHEDULE

- Selection of a site to erect the pithouse on. Taking care to survey the area closely to ensure that any prehistoric site will not be disturbed.

- Construction of the pithouse. This will take place in late September or October in order to allow for any difficulties in construction.

- Occupation of the pithouse. According to Teit the pithouse was occupied during the first moon of the new year. The native calender placed the new year at a point coinciding with the early part of November, but, it is also stated that occupation of the pithouse occurred with the advent of cold weather and lasted till the weather warmed. Taking this into account with the statement that occupation lasted four moons, the minimum period of occupation will be attempted. That being of three months duration begining in the middle of November.

- Abandonment of the pithouse. After the full term of occupation the pithouse will be vacated. At this point it will either be left to the elements or burned down.

- Excavation of housepit. After five to ten years in which the collapsed pithouse has been allowed to settle and begin decomposition, the remaining housepit will be excavated.

TESTING METHODS

BASIC

All tests are to be conducted in a scientific manner in order to maintain a standard of results which will be of value in future analysis. Efforts will be made to instill the importance of this in all participants. Data will be analized against a control situation where practical. All tests which are of a repetative nature will be recorded with time of day according to the 24hr. clock. The records of tests will be under the name of the recorder. The recorder may change for any specific test. Where previous knowledge is required for tests, such as climate, the recorder may change but will be supervised untill believed competant. Part of the attempt to maintain participant interest will be to change over repetative tasks. Subsidiary tests will be tested as fully as possible, but, believed weaknesses in testing situations will be stated. If this will not explain the entire capability of the test it will at least explain the bias. Most tests will follow from ethnographic sources. Each will be explained according to the source and the changes from the source. In order to provide concise information on resources available a note will be made of the surrounding environment (soils, flora, fauna, etc.)

STRUCTURE AND MAINTENANCE Construction of pithouse will be according to Teit, for basic design, with any exceptions duly noted. One probable exception will be that the slope of the roof will not be as steep as that illustrated by Teit. (This decision is based on 1. conversation with Arn Stryd who mentioned slope of side rafter found in Cly site, 2. paper on the building of a pithouse at Shuswap Lake Park by Nancy Condrashoff where her informant stated that the roof was too steep) The construction site will be surveyed and photographed prior to clearing. A grid will be layed out and construction will take place within this grid. A similar area of land will be chosen, in the same locality, to act as a control. Soil samples will be taken and ground solidity noted prior to construction. These will be compared with soil samples taken after occupation and it will be noted wether or not the activity has made the earth more or less compact. Co-relation will be made between activity areas and degree of compactedness. Photographs and grid-related drawings will be used to illustrate all the stages of construction. Excavation will be with digging sticks, etc. unless such is found to be unreasonable. The logs to be used may be cut by axe for the sake of time and that our familiarity with native tools and methods

is not sufficiently experienced to produce a relevant man-hour study. The maximum and minimum diameters of each log, as it is placed in the pithouse, will be kept, along with the type of tree which the log is from. The angles-alignment of the logs in place will be noted. The logs will be bound together with rope made of twined root fibres. A section of this rope will be kept in order to analyze it for strength. The alignment of supporting structures at the end of occupation will also be noted and compared with the original alignment and activity in and on house. Any supposed weak spots will be noted during and after construction. Depth of covering earth will be noted before and after occupation. Man-hours required to construct and maintain pithouse will be noted. All maintenance will be described as to nature, reason for need and steps taken to repair. These will be photographed. Repair will follow as closely as possible pre-historic methods.

CLIMATE - INTERIOR AND EXTERIOR Coresponding in time to the construction of the pithouse, an exterior weather station will be erected. This will include instruments to test rainfall, barometric pressure, humidity, temperature, wind speed, wind direction, and daylight hours. Other instruments may be included if found to be of value to the study. Part of the accumulation

of data for external climate will include following the daily weather forcasts and readings. Visual data will include cloud cover, type of cloud, cloud height and perhaps, angle of sun, and approximate hours of sunlight which fall on pithouse.

Interior tests will be set up during the construction of the pithouse. Temperature and humidity will be recorded with a temperature station in each of the pithouses' four quadrants. This will thereby co-respond to alignment and area function. Also to be tested are smoke accumulation in the house, air circulation, and moisture seepage.

During the first week a reading will be made every two hours on most instruments. Thereafter maximum and minimum periods will be the main record checks, with a weekly check of every two hours during one day in order to support the original record of maximum and minimum periods. If, in order to supply more data for further testing, more frequent readings are needed, then they will be carried out.

HEATING (will co-relate closely with tests on maintenance and climate)

Heating will be by wood fire. How often must the fire be lit to provide comfortable interior temperature. Note will be made of accumulation of fly-ash, amount of smoke in interior. A test will be conducted to find the most advantagious position for the fire and

to see if there is any advantage to more than one or individual fires. With each of these tests note will be made of increase or decrease in density of smoke in interior, of improvement or loss in overall temperature, of convenience and practicality as related to functions ie. cooking, heating, etc., necessity of draft, man-hours required to maintain ie. stoke, start, maintain, clean, etc., and size of fire. A check will also be made of the most convenient and most effective fuels found in local area.

EXCAVATION TECHNIQUES At the end of the period of occupation the inhabited with use structure will be either allowed to collapse naturally or be burnt down. This will provide opportunity to examine the structure for weak areas, strong areas, collapse sequence, degree of structure pattern disturbance (how does fallen structure relate to erect structure), and later, upon excavation, settling pattern, stratagraphic variance from simple floor-wood roof-earth roof-topsoil, disturbance of floor deposits due to collapse and the most accurate method of excavation of a pithouse.

The accumulation of accurate data on these events will be facilitated by the grid work done before construction and all results will be related as events within this grid. Two fixed datum points will be

established within this original grid. Excavation of collapsed pithouse structure will be carried out not less than five to ten years after collapse. In order to test floor disturbance due to collapse and accuracy of digging methods, numbered artifacts will be placed in pithouse before collapse and specifically related to the grid. To keep test as accurate as possible the placement of these artifacts will be carried out and mapped by one person and the later excavators will not know of their exact placement. The excavators will lack all information possible to withold about the pithouse, so as to maintain, as best possible, an objective outlook on their part.

CULTURE HISTORY Further tests in culture history ie. the manufacture of stone tools, the weaving of baskets, etc. will be carried out on the initiative of participants in the project, The prime interests of the project are the above-mentioned tests*and they will receive priority attention. Further tests in culture history are secondary. Those which are preformed will be fully described.

*(Structure and maintenance, climate, heating, etc.)